



Proximity Permitting Process in NZ Electrified Rail Networks

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KiwiRail 



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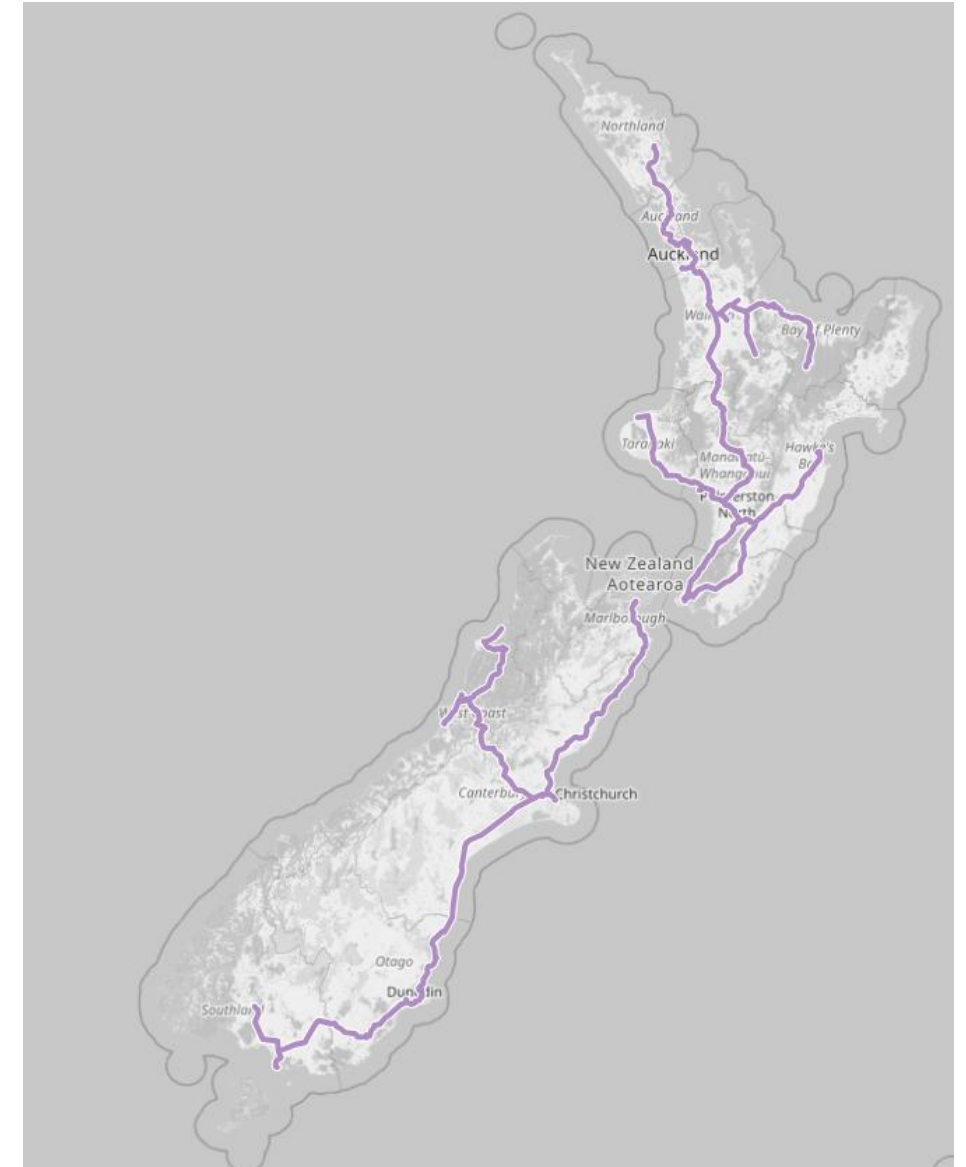


Working in an Electrified Rail Corridor



What is an Electrified Rail Corridor?

- KiwiRail own and operate nearly 4000km of Railway
- 3 different areas are Electrified:
 - Auckland Metro (25kV AC) – Approx. 235km
 - North Island Main Trunk (25kV AC) – Approx. 410km
 - Wellington Metro (1500V DC) – Approx 210km
- Not just rails and overhead wires!
- Includes all the surrounding land to the railway in order to safely separate the public from railway operations.
- Public areas e.g. level crossings, road/pedestrian bridges and stations are all in the rail corridor
- The rail corridor is a multi-hazard area
- A rail corridor that is also electrified adds extra challenges for both public safety and rail staff safety





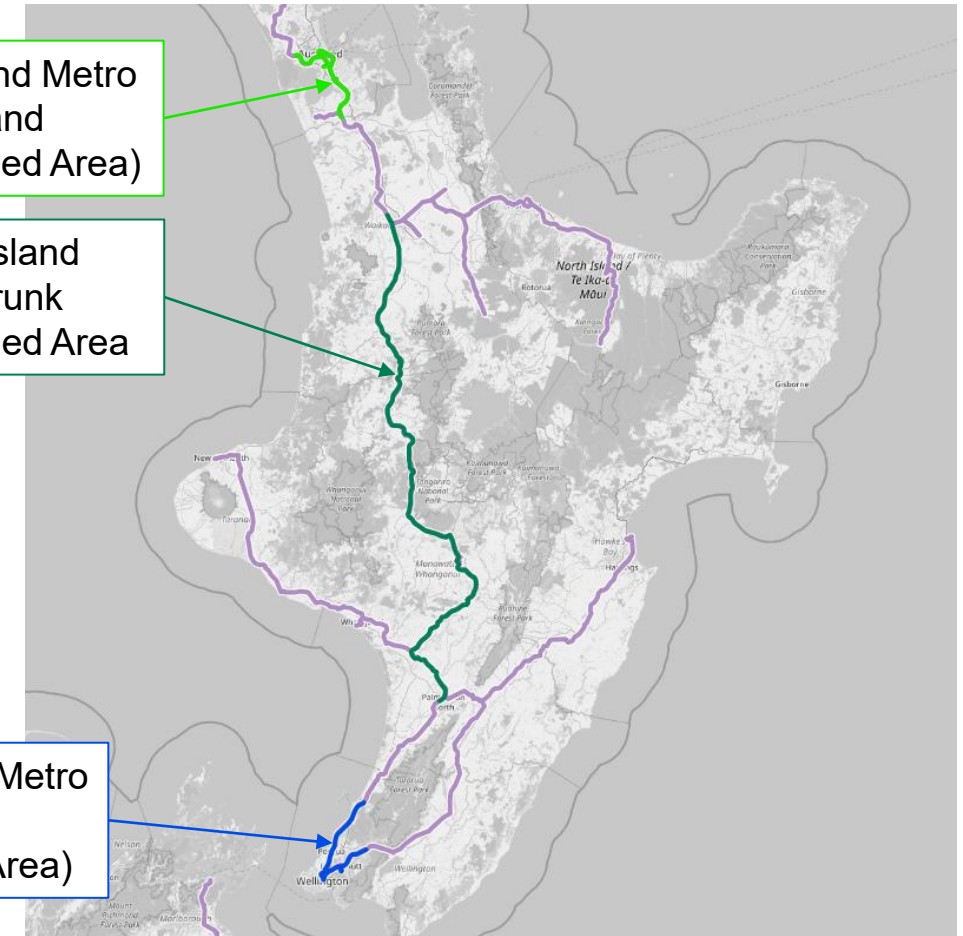
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Auckland Metro
(Auckland
Electrified Area)

North Island
Main Trunk
Electrified Area

Wellington Metro
(Wellington
Electrified Area)





Electrified Areas - Components



Tensioned
Contact /
Catenary Wire

Cantilever /
Registration
Arm

Traction Mast
/ Portal

Feeder Wire

Rails

Contact Wire
Height ~4.2-
6.2m above
Rail Level





Electrified Areas – Types of Work

Track Maintenance

- Sleeper Replacement
- Ballast profiling
- Rail Grinding

Traction / OLE Maintenance

- Height & Stagger Measurements
- Insulator Cleaning
- Contact Wire Replacement
- Earthing and Bonding

Temporary Structures

- Scaffolding
- Fencing

Adjacent Buildings or Structures

- Painting Walls
- Window/Roof Cleaning
- Bridge Inspections

Signalling Systems

- Point Machine Maintenance
- Level Crossing Systems
- Track Circuits/Axle Counters
- Signal Aspect Maintenance

Vegetation Control

- Trimming Trees, Bushes
- Cutting Grass

Tunnels

- Tunnel Inspections
- Repair Work

Rail Vehicles

- Track Tamper
- Track Inspection Vehicles
- High-Rail Machinery
- Mobile Cranes

Public Areas

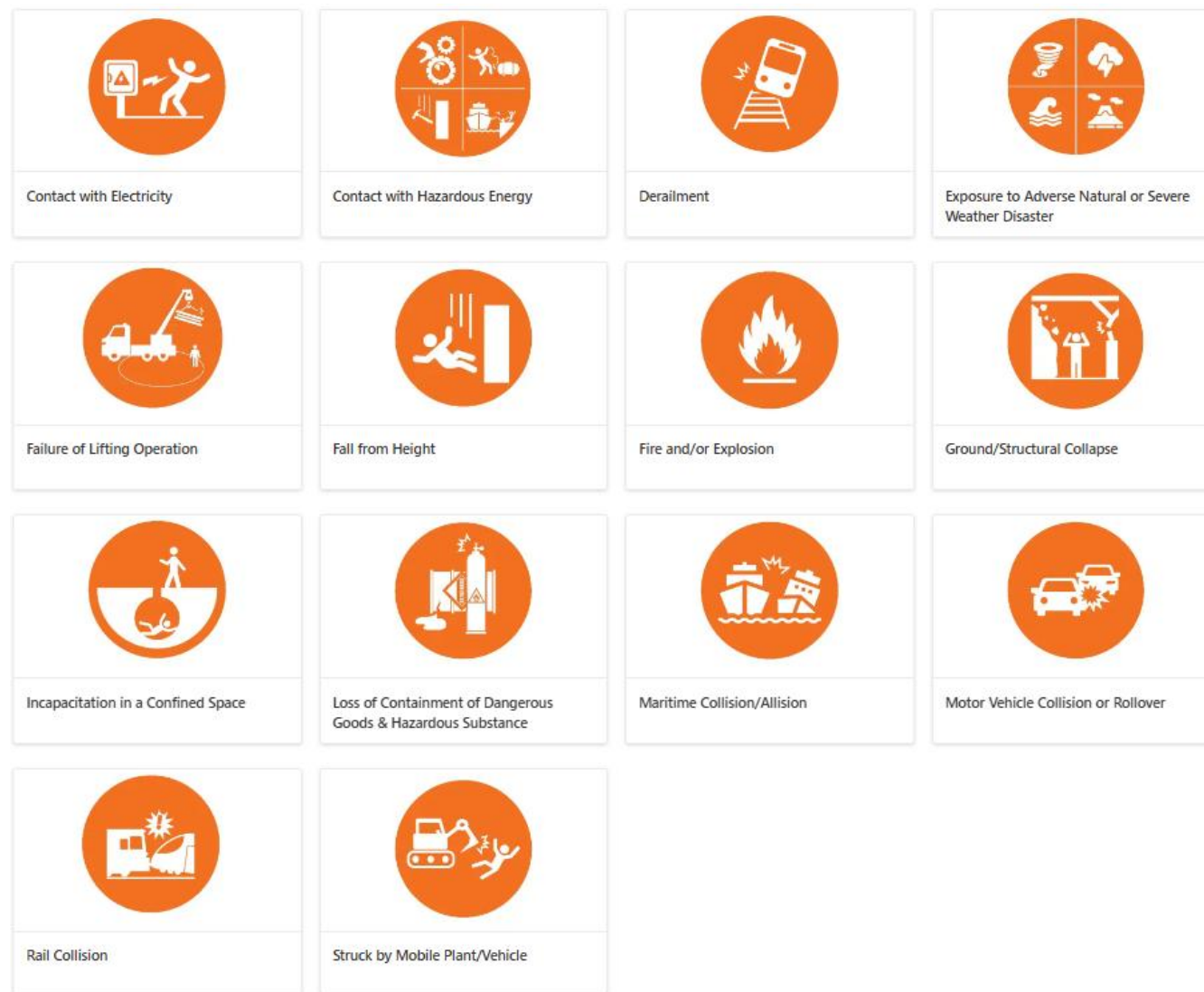
- Stations
- Level Crossings

Traction Safety Principles



Critical Risk

- Contact with Electricity is one of KiwiRail's 14 Critical Risks
- Extensive processes and procedures outline the controls that we apply
- Safety Clearances based on the Principles outlined in ECP34
- These have been brought in to focus in recent years after an incident at Parnell in Auckland in 2024
- Traction safety principles are core to enabling safe work in electrified areas





Minimum Approach Distances

Minimum Approach Distance (MAD)

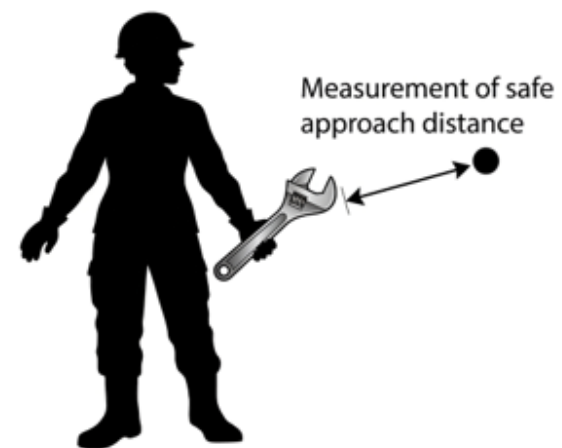
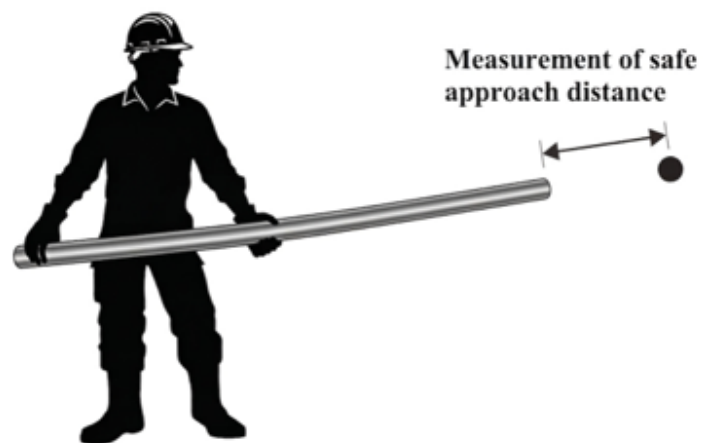
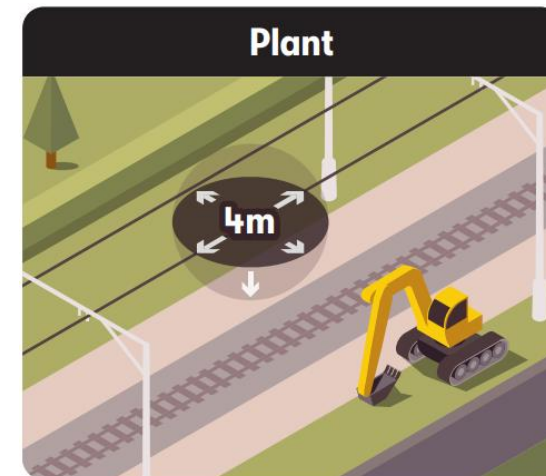
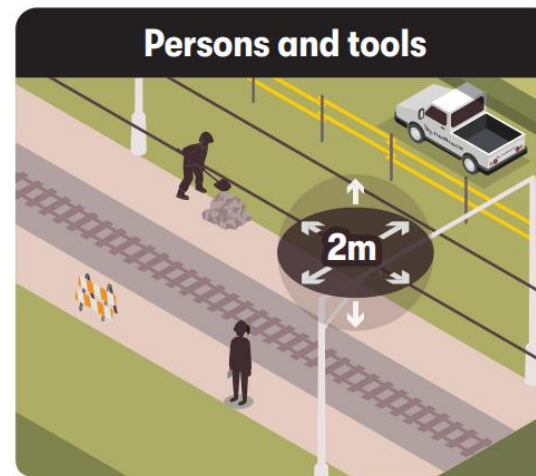
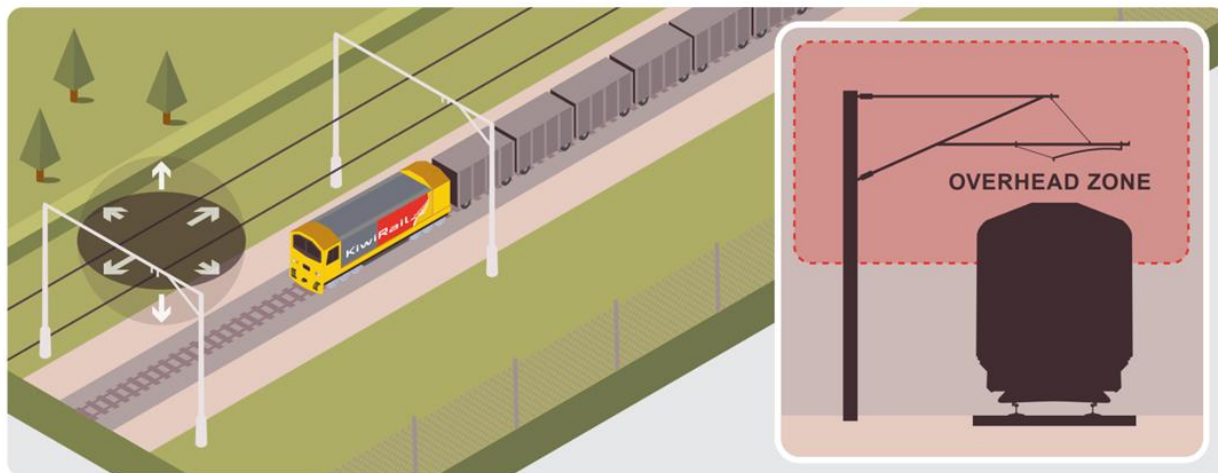
“The minimum approach distance to any live equipment, beyond which any person, plant, tools, equipment or devices cannot pass without additional safety precautions. The distance is measured from the position of plant or person carrying out the work including any tools that are attached to plant or a person is holding, to live equipment.”

Reduced Minimum Approach Distance (RMAD)

“The absolute minimum approach distance, beyond the MAD, to any live equipment. Working within the MAD but outside the RMAD can only be undertaken when additional controls (to those implemented for approaching the MAD) are implemented. The distance is measured from the position of plant or person carrying out the work including any tools that are attached to plant or a person is holding, to live equipment.”



Minimum Approach Distances



Working Within the MAD



Electrical Work Authority

“An Electrical Work Authority is the authorisation, given by the Traction Competent Person to a Person in Charge to allow work to commence on or near specific high voltage equipment normally in service or ready for service.”

Otherwise known as “written permission” to work within the MAD in KiwiRail Traction Electrified Areas (as required by the NZ ESR).

KiwiRail’s main EWA is called a “Permit to Work”.
All controls and conditions are listed on the permit.

Not to be confused with a “Permit to Enter” which is required to work in any rail corridor (electrified or non-electrified)



Working in the MAD – Typical Controls

Elimination

- Isolating and earthing the line. This is the safest approach where practicable. A Permit to Work can then be issued to allow personnel to work safely within the MAD.

Engineering

- Providing protection by means of physical barriers between personnel and live parts. This may permit work closer to live parts in accordance with EN 50122-1 requirements.
- Height limiters on shape changing plant
- Drones and other remote monitoring equipment
- Laser measurement systems
- Machine Avoidance Systems

Administrative

- Using an Electrical Safety Observer to manage the risk of plant or people (including tools and materials) breaching the MAD
- Worker competency
- JSA and pre-start briefing



Challenges with current Electrical Work Authorities

- 1 main form to cover 90% cases where an EWA is required
- Form is basic (not always bad!)
- Lacks room to add conditions and additional controls
- Designed to cover any work in the MAD, including those working in proximity to live parts or isolated and earthed OLE or substation equipment
- Broad scope of coverage meaning that specific work types and the associated controls can not be easily described on the permit
- New ways of working being developed that cannot have all the safety controls written on the permit

KiwiRail **EF201**

PERMIT TO WORK NEAR RAILWAY POWER LINES

Permit No.

--	--	--	--	--	--	--	--	--	--

 Time

--	--	--	--	--	--	--	--	--	--

 Date

--	--	--	--	--	--	--	--	--	--

To: (Person in Charge)

You are authorised to work near the (delete not applicable*):

ALIVE*	ISOLATED AND EARTHED*	Line Voltage *25000 volt AC *1500 volt DC *Othervolt
OVERHEAD EQUIPMENT*	SUBSTATION EQUIPMENT*	

At Line.....
Between km and km
To enable the following work to be undertaken:

Prescribed Safe Working Conditions

Reduced minimum approach distance	Persons.....	Plant.....	Scaffolding.....
-----------------------------------	--------------	------------	------------------

Other conditions

Permit issued by: (Competent Person)

A Safety Observer

IS	IS NOT
----	--------

 required (delete as applicable)

Safety Observer name
1.
2.

I confirm receipt of this permit and understand the conditions under which it is issued

Signed: (Person in Charge)

IMPORTANT

1. This permit is for electrical protection **only**. Additional track protection is required.
2. The permit holder must meet any other safety requirements specified.
3. If the permit holder is changed, the new holder must sign below.
Signature of person relieved: Signature of New Holder:

CANCELLATION OF PERMIT TO WORK

I confirm that:
1. All staff and equipment working under this permit are now clear.
2. Every person has been warned to treat **ALL LINES LIVE**.
3. The work I performed did not reduce the safety or reliability of the rail system.
Signed: (Person in Charge)

Train Control Emergency Number 0800 808 400 Issue 3 12/10

Development of Proximity Working



Minimum Approach Distances - Zones

Introducing the idea of 3 “zones” relative to the MAD:

- **Safe Zone**: Anywhere outside the MAD where there is no risk that the MAD can be breached by conducting the particular work activity
- **Proximity Zone**: Inside the MAD but not the RMAD
- **Live Zone**: Inside the MAD and the RMAD

These zones would require different controls to work safely.

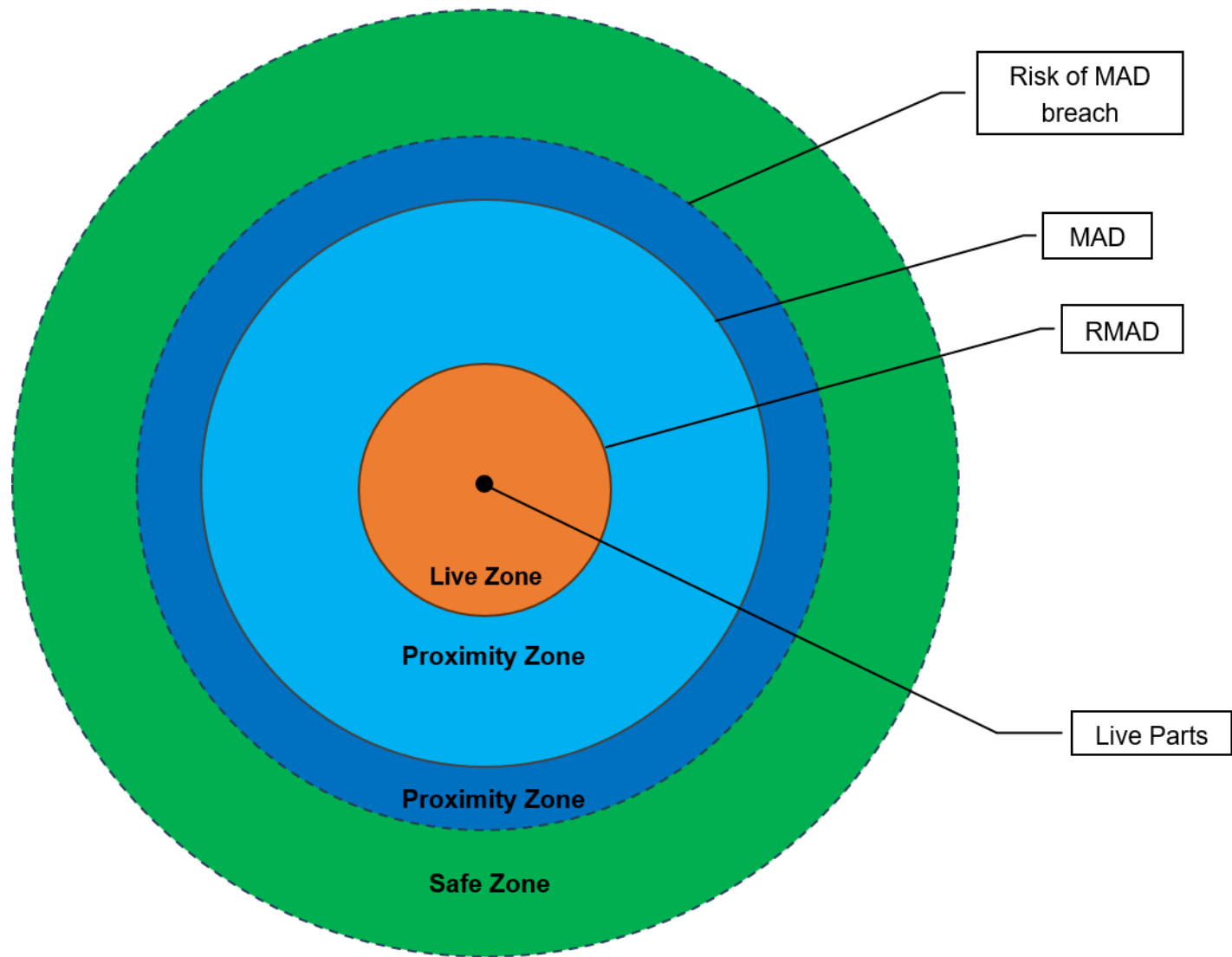
Defining the zones enables clear communication on when those controls would apply

The Fundamental Safety Principles of working in the MAD do NOT change, they are just authorised and communicated in a better way.

KiwiRail is rolling out a new set of EWAs to align with this new approach.



Minimum Approach Distances

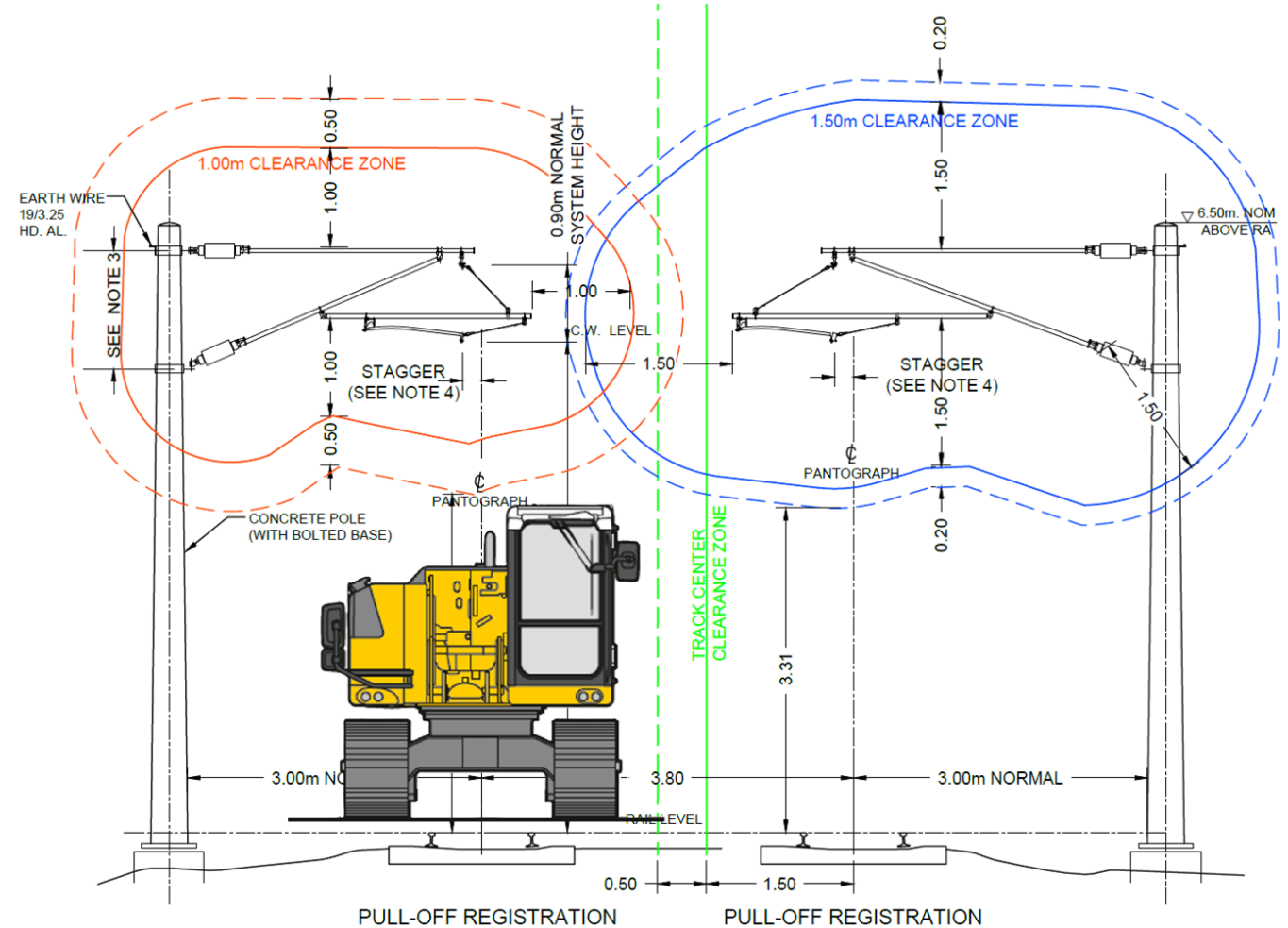


Applications



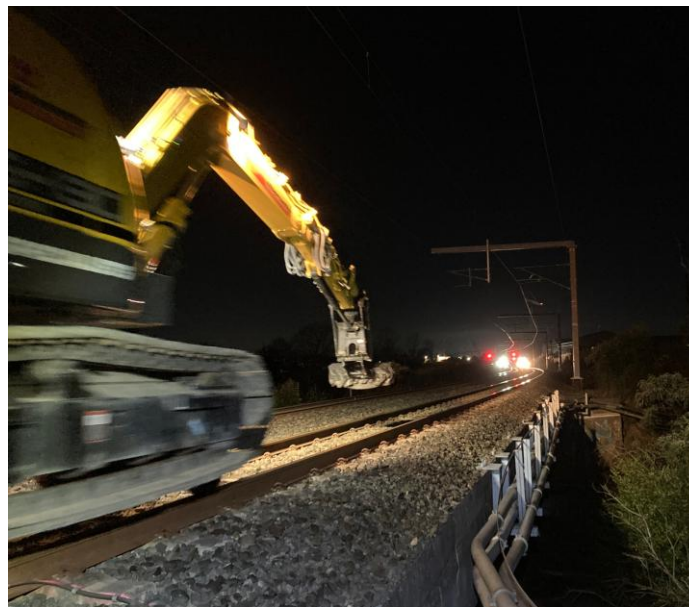
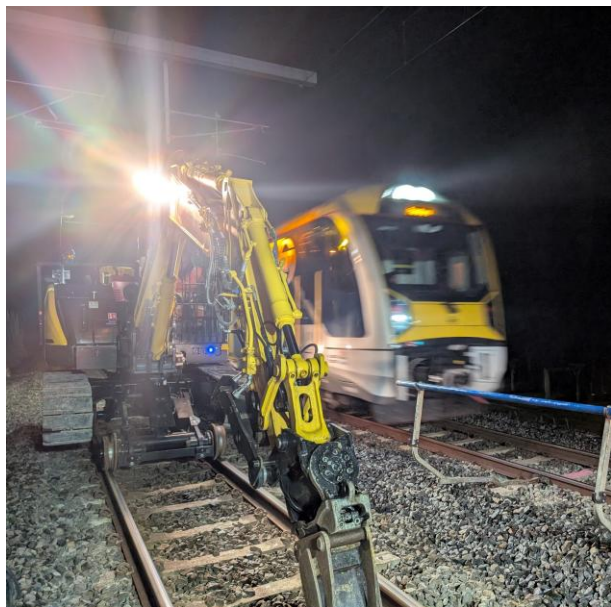
Applications of Proximity Working

- Auckland Metro relies on night-time shut-downs of the rail network to carry out maintenance.
- City Rail Link opening will change this
- New way of conducting some types of track maintenance
- Working under a de-energised main while the other main is live with trains running
- Plant need to work within the MAD
- Machine Avoidance System on the plant
- Permit to Work system not suitable
- Proximity Working offers a new approach
- Additional controls in place





Applications of Proximity Working





Thank You
Questions?

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